

Red Hat
Summit

Connect

OpenShift Virtualization

Modernization Through Migration

Koray Şeremet

Senior Manager, Solution Architecture

Reality of enterprise IT environments

Mixed infrastructure environments, diverse app portfolios, & limited automation

Infrastructure



Bare metal



Virtualization



Edge



Private cloud



Public cloud

Applications



AI/ML



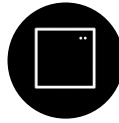
Analytics



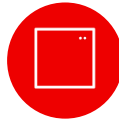
Serverless



Cloud-native and
microservices



Java™



.Net



ISV

People & Processes



Developer
tools



Pipeline
and
processes

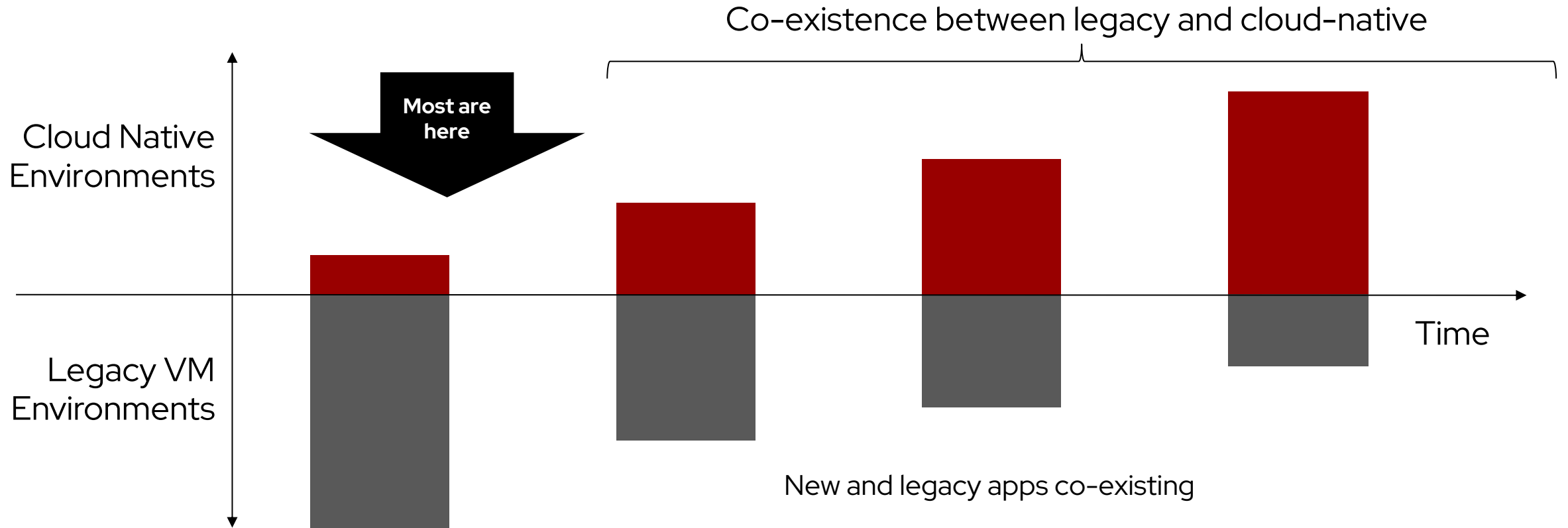


People
and
policies

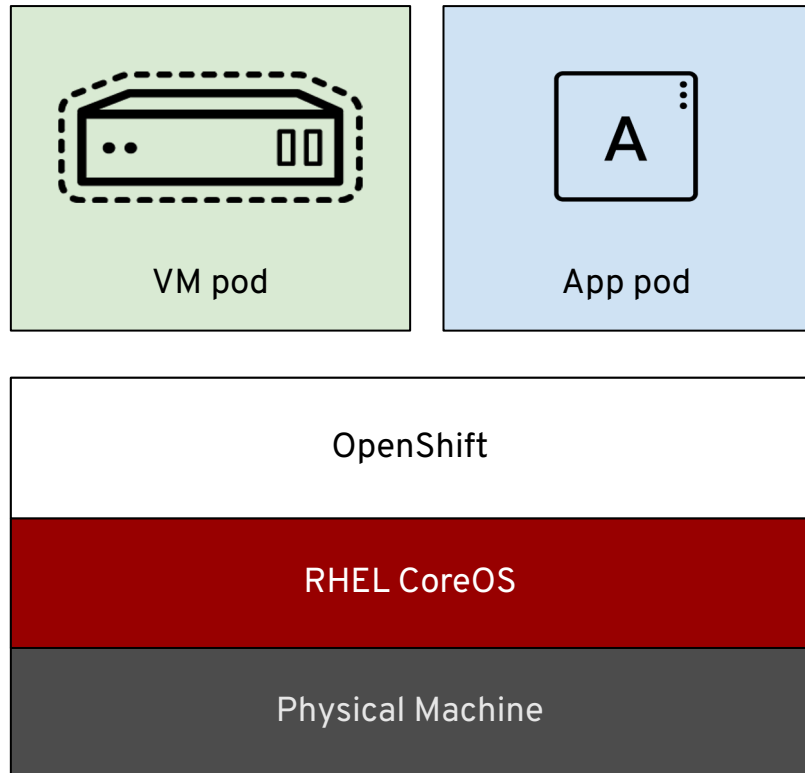


The right
skills

The move from Virtual Machines to Containers



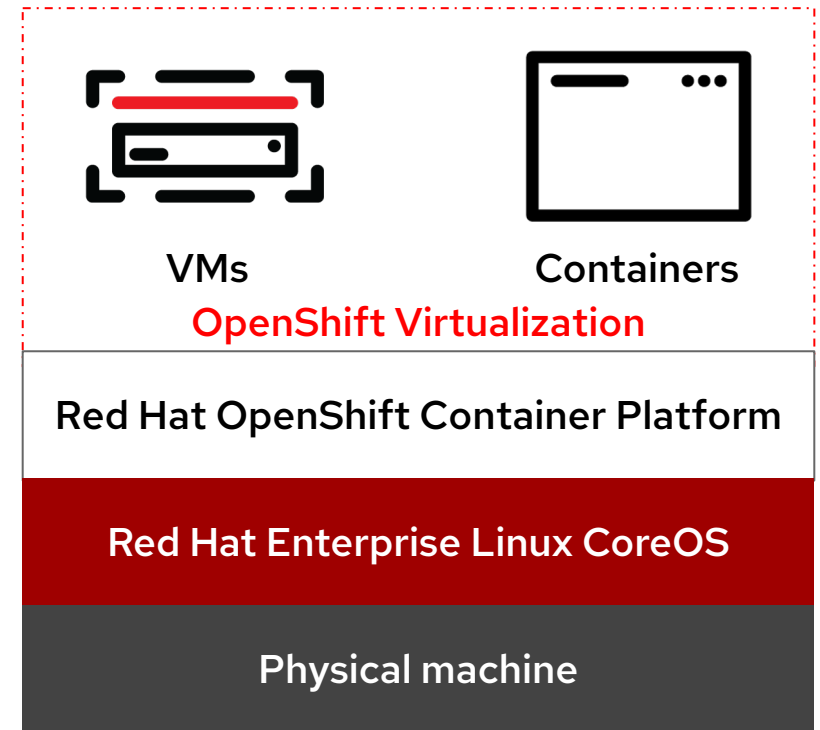
What is OpenShift Virtualization?



- Virtual machine running in containers
- Using KVM hypervisor
- Scheduled, managed and deployed by Kubernetes
- Using kubernetes resources and services
- Persistence with storage Class or PVC

What is OpenShift Virtualization?

- ❑ Included feature of the OpenShift
- ❑ RHEL guest entitlements are included
- ❑ Supports Microsoft Windows guests -
Microsoft Server Virtualization Validation
Program (SVVP)



KubeVirt becomes a CNCF incubating project

KubeVirt collaborates and integrates with many other Cloud Native projects



30

Releases (since Sandbox)

337

Contributors

133

Contributing Companies

Leverage the Entire CNCF Project Ecosystem

KubeVirt¹

133

Contributing Companies
CNCF Incubating project

CNCF Ecosystem Projects²

157

Observability & Alerting (Prometheus)
L2 Networking (Multus, Kube-OVN)
Service Meshes (Istio)
Automation (Tekton, ArgoCD)
Workload migration (Konveyor)

¹<https://www.cncf.io/blog/2022/04/19/kubevirt-becomes-a-cncf-incubating-project/>

²<https://www.cncf.io/reports/cncf-annual-report-2022/>

Bring traditional VMs into OpenShift

Modernize at your own pace

Traditional VM behavior in a modern platform

- ▶ Administrator concepts and actions
- ▶ Network connectivity
- ▶ Live migration

Leverage existing VM roles and responsibilities

- ▶ Maintain business critical application components
- ▶ Modernize skill sets over time

Migration Tooling

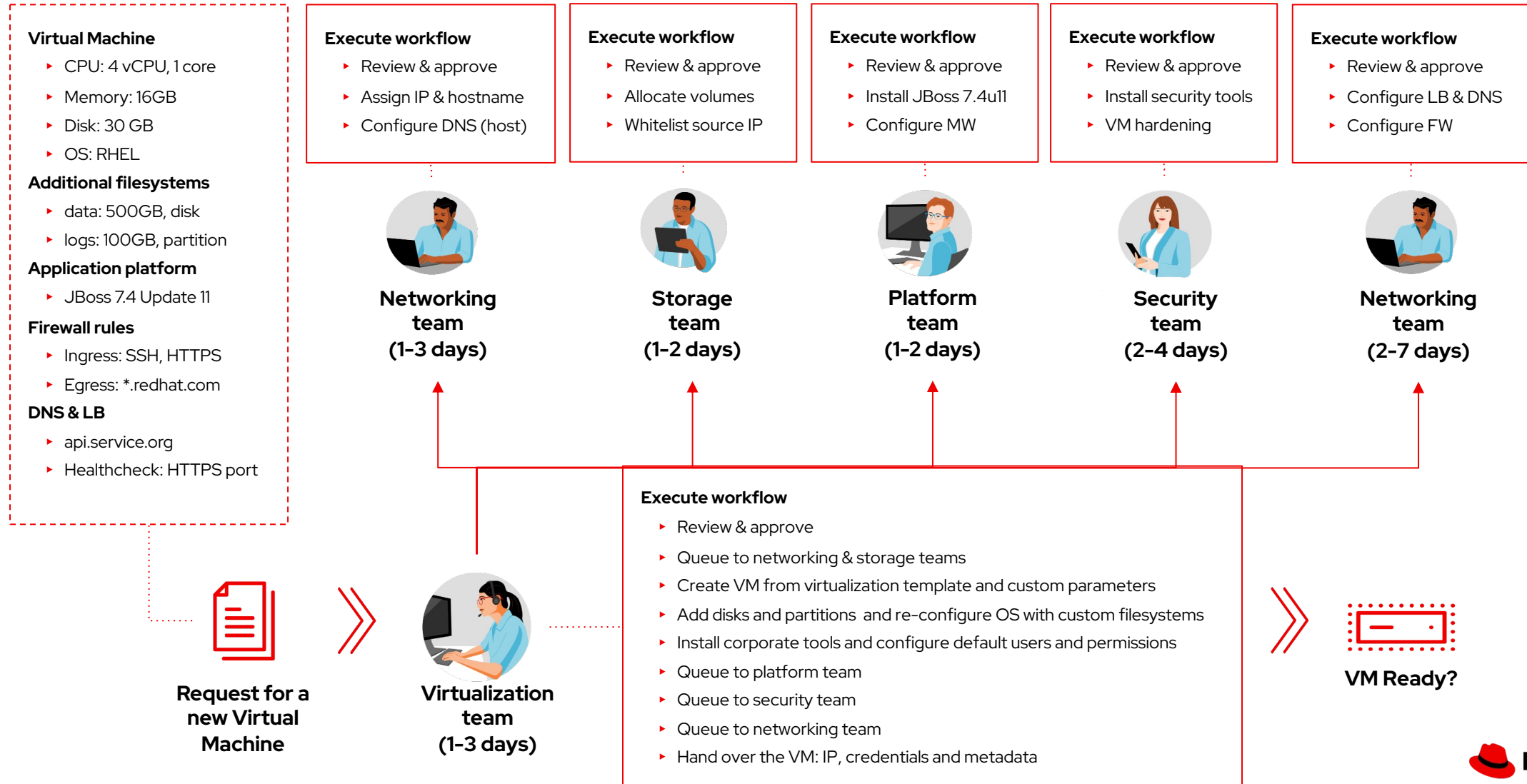
- ▶ **Migration Toolkit for Virtualization** (MTV)
- ▶ Warm migration of VMs at scale

Name	Migration analysis	VM name	Datacenter	Cluster	Host
<input type="checkbox"/>	⚠	VM1	datacenter1	cluster1	host1
<input type="checkbox"/>	✓	VM2	datacenter1	cluster1	host1
<input type="checkbox"/>	ℹ	VM3	datacenter1	cluster1	host1
<input type="checkbox"/>	✓	VM4	datacenter1	cluster1	host1
<input type="checkbox"/>	!	VM5	datacenter1	cluster1	host1

Creating a migration plan with MTV

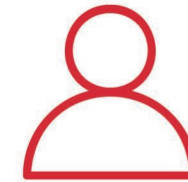
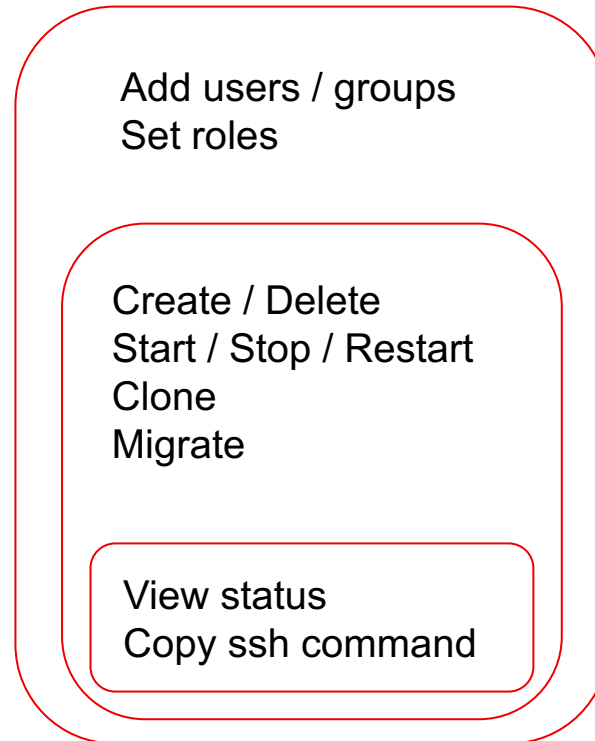
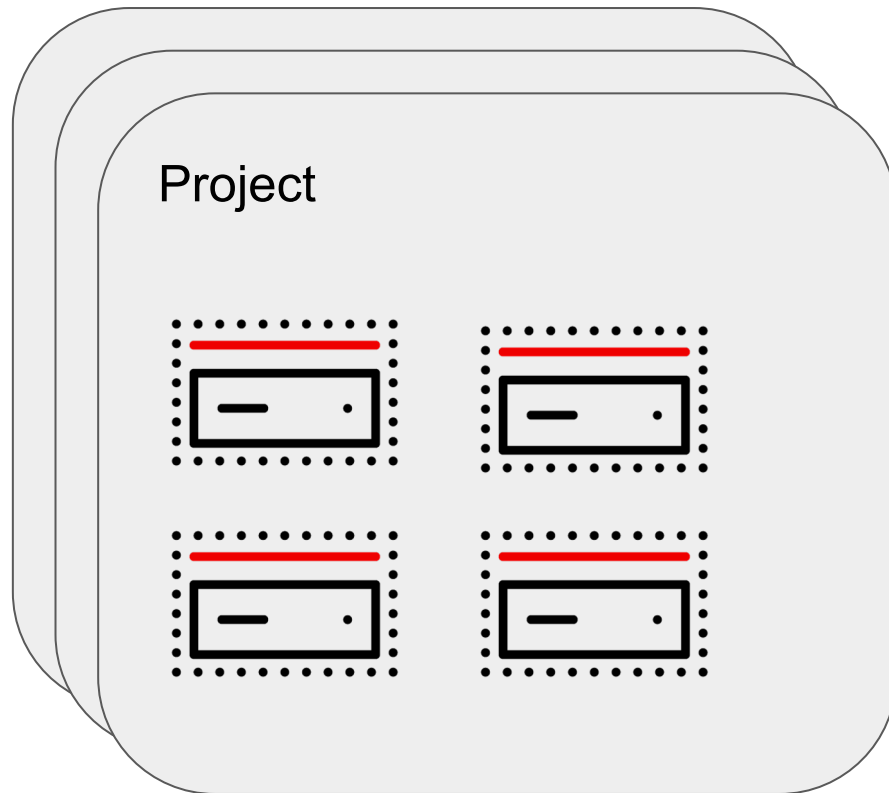
Fragmented 'approach' to VM provisioning

A process that can take weeks trapped in queues and iterations

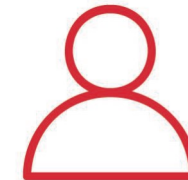


Self-service VM by Project

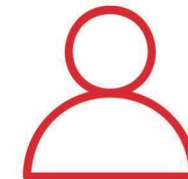
Assign roles and collaborate around Projects as you would in the cloud



Project owner



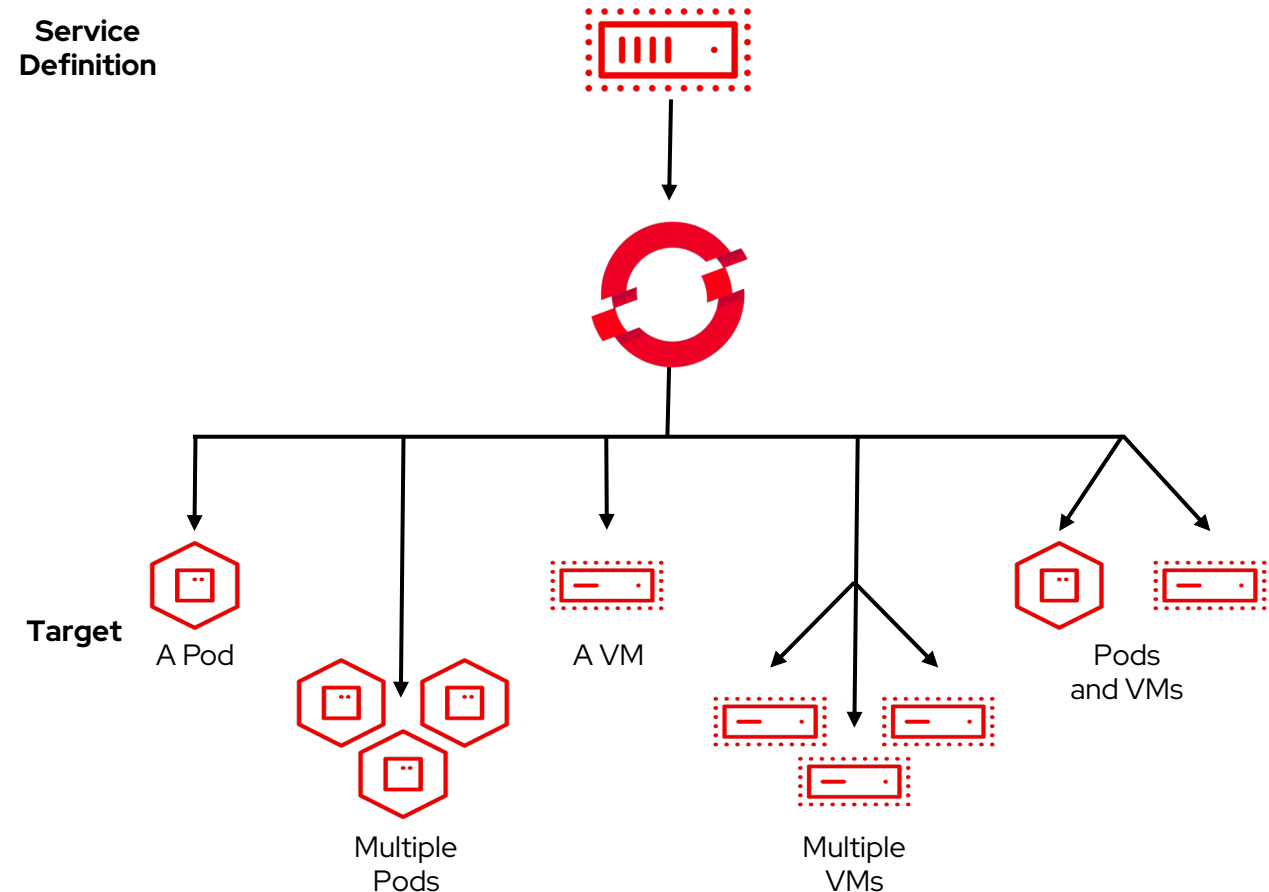
Project editor



Project viewer

Application-centric Technologies with Virtual Machines

- Virtual machines utilize OpenShift and Kubernetes functionality natively
 - Service, Route
 - GitOps
 - Pipelines / Tekton
 - and others
- Containerized and virtualized app components don't know whether the other is virtual or containerized
- OpenShift Virtualization brings the benefits of Kubernetes without containerizing the application



Next Gen approach to VM provisioning

A process that can be optimized down to a few minutes

Virtual Machine

- ▶ CPU: 4 vCPU, 1 core
- ▶ Memory: 16GB
- ▶ Disk: 30 GB
- ▶ OS: RHEL

Additional filesystems

- ▶ data: 500GB, disk
- ▶ logs: 100GB, partition

Application platform

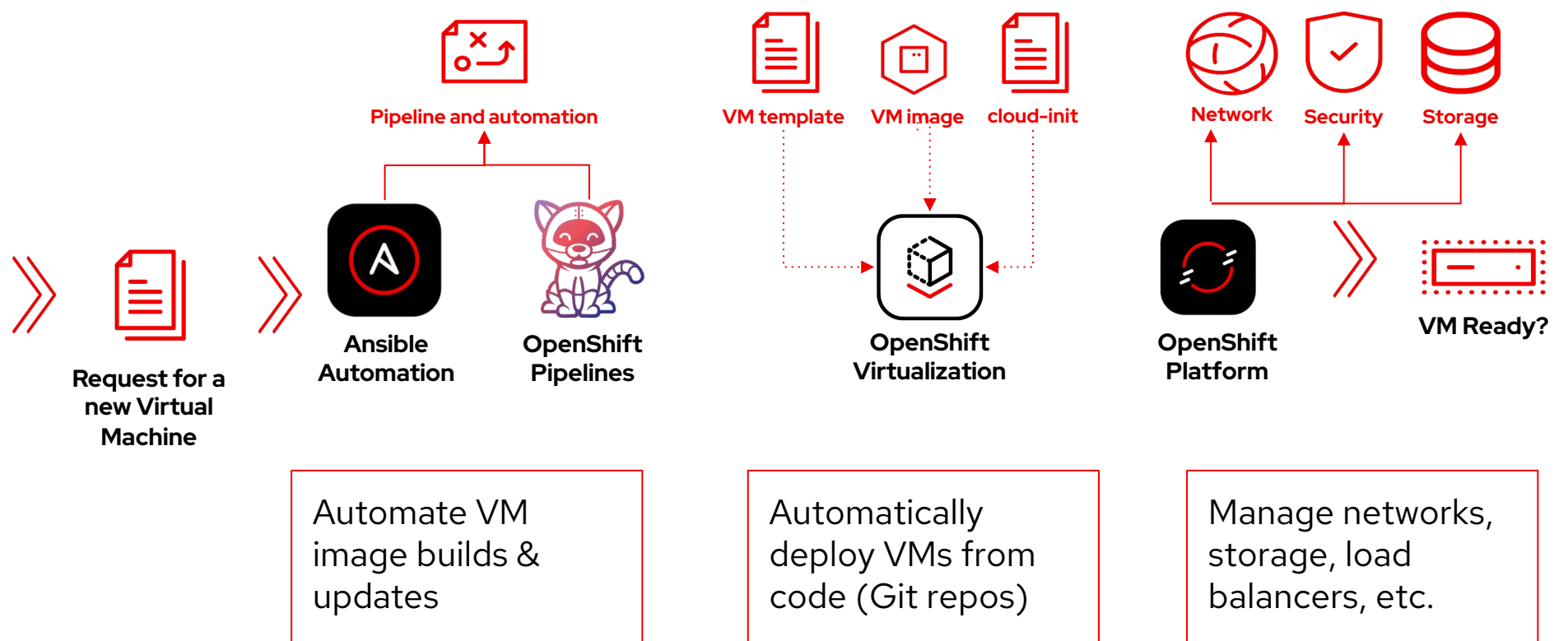
- ▶ JBoss 7.4 Update 11

Firewall rules

- ▶ Ingress: SSH, HTTPS
- ▶ Egress: *.redhat.com

DNS & LB

- ▶ api.service.org
- ▶ Healthcheck: HTTPS port



Consolidate OpenShift Clusters

Hosted Control Planes with KubeVirt provider



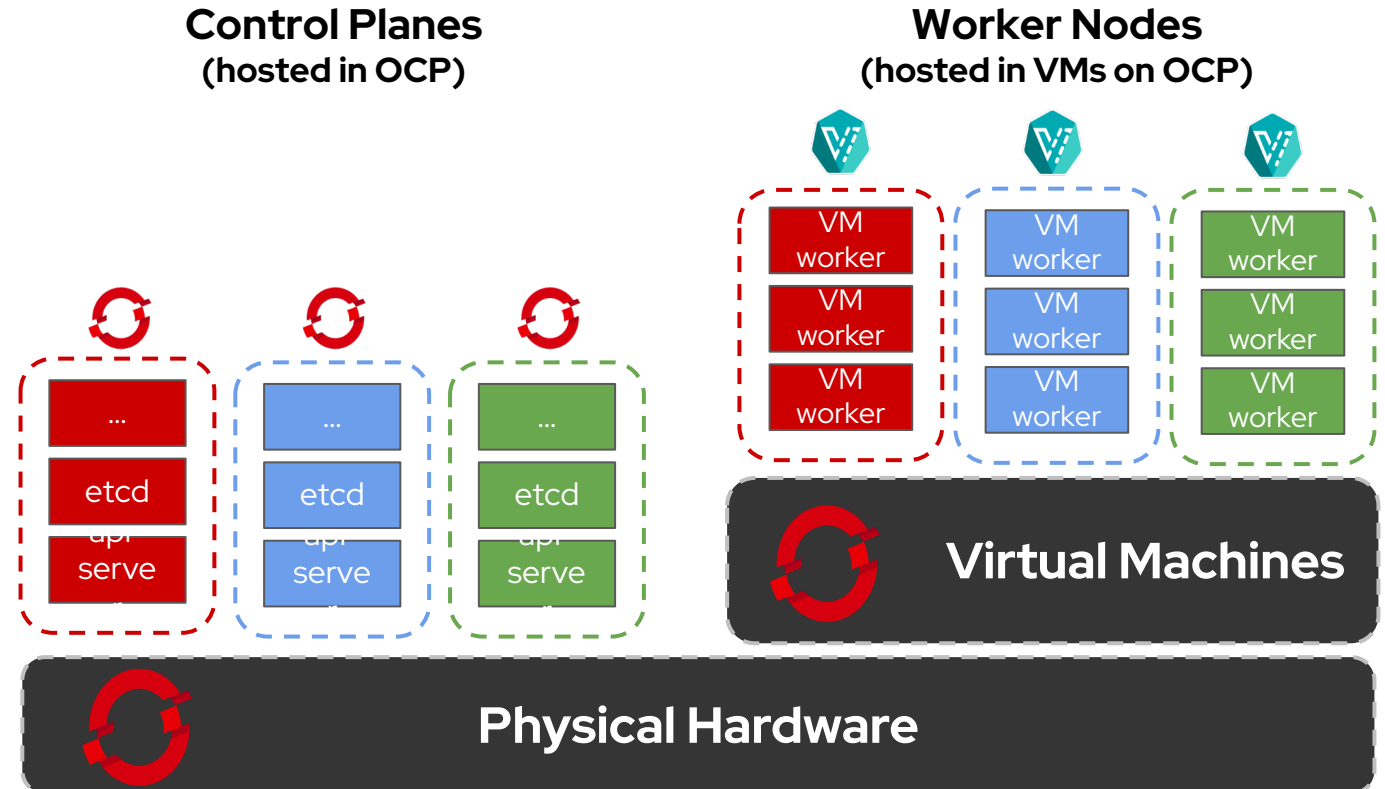
Increase Utilization of Infrastructure

- Consolidate multiple control planes to reduce unused and underutilized infrastructure
- Increase bare metal node utilization by hosting virtual worker nodes for multiple clusters

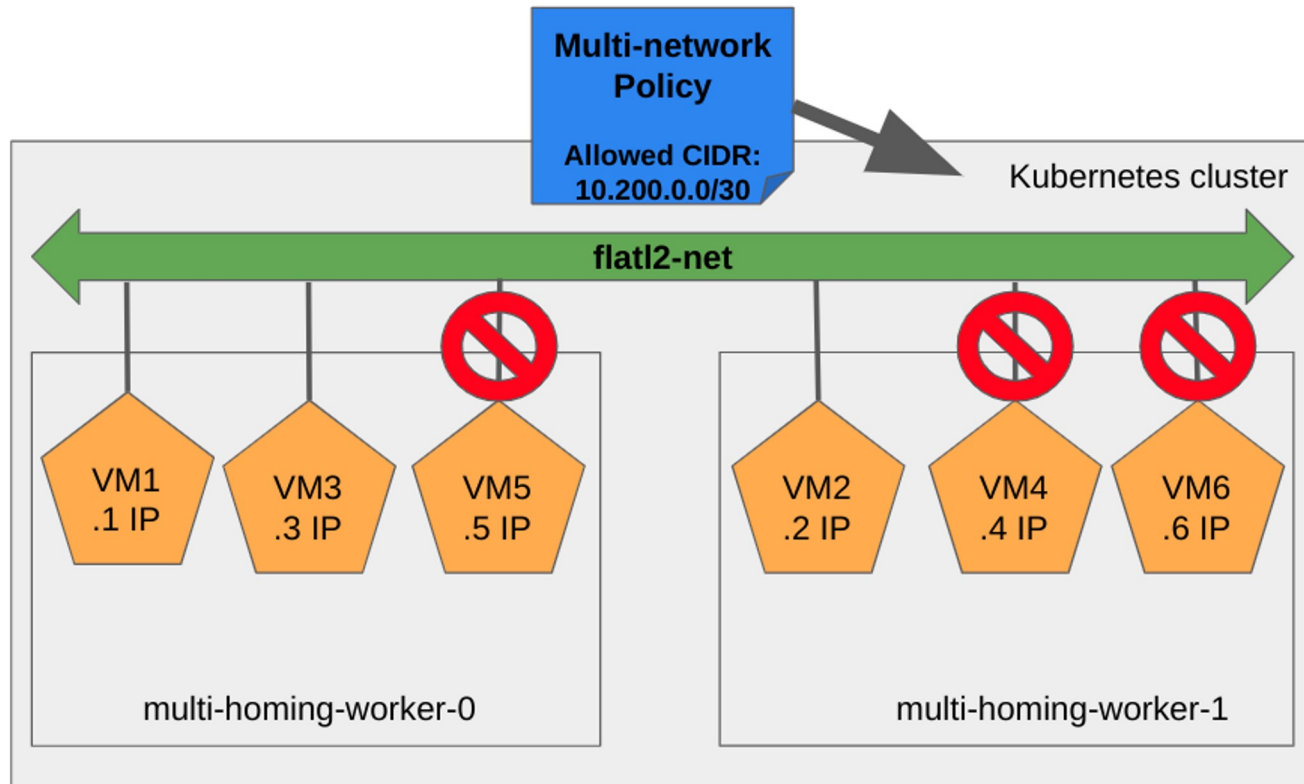


Reduce Dependency on Legacy Virtualization

- Underlying virtualization layer is included with hosted OpenShift cluster entitlements (no separate licensing needed)



Secondary networks using OVN-Kubernetes



```
---
apiVersion: k8s.cni.cncf.io/v1beta1
kind: MultiNetworkPolicy
metadata:
  name: ingress-ipblock
  annotations:
    k8s.v1.cni.cncf.io/policy-for: default/flatl2net
spec:
  podSelector:
    matchLabels:
      name: access-control
  policyTypes:
  - Ingress
  ingress:
  - from:
    - ipBlock:
        cidr: 10.200.0.0/30
```

Core Enterprise Capabilities

Currently Supported

Near

Future



Core Functionality

- Live Migration between nodes
- Infrastructure & Application fencing
- Performance and Limits Parity
- Microsoft SVVP certification, any currently supported Microsoft Windows
- RHEL VMs
- Hot pluggable disks / VM disk resize
- Network hotplug
- DRS / CPU overcommit
- GPU passthrough / vGPU support
- Non-disruptive upgrades

- CPU Hotplug
- **Microsoft Windows Server Failover Cluster (WSFC)**
- Persistent vTPM support
- UEFI and Secure boot support

- Higher density with safe memory overcommit
- Real-Time VMs
- ARM based systems

Storage and Networking

Currently Supported

Near

Future



Storage, Backup and DR

- Storage profiles for all major storage providers - ODF, Netapp, Pure/Portworx, Dell, Hitachi, HPE, IBM
- VM export
- Backup / restore with OADP
- Portworx support for Metro-DR and Async-DR
- Kasten K10 by Veeam
- Trilio TVK
- Storware vProtect

- NetApp Astra data protection for VMs
- Metro-DR (Sync) with ODF

- Regional-DR (Async) w/ ODF
- OADP to support data mover for block volume



Networking

- DPDK (TP)
- SR-IOV
- Dual-stack IPv4 & IPv6
- Flat L2 secondary networks using Multus
- **Service Mesh**
- Flat L2 Overlay network without the need to configure host networking
- **Secondary network ipBlock policies and microsegmentation**

- DPDK (GA)
- OVN Kubernetes localnet as an alternative to the Bridge CNI

- Single-stack IPv6
- Hardware offload
- **IPAM**
- **Port mirroring**
- Services over a secondary OVN Kubernetes
- Localnet QinQ

Management

Currently Supported

Near

Future



DevOps and Platform Engineering

- Deploy and Configure virtual machines using Tekton pipelines
- Multi-cluster management using ACM and AgoCD
- Self-service and users roles

- Example Git repo w/ best practices
- Tekton pipeline to upload customised VMs to Git Repositories
- Deploy hosted OpenShift Clusters with Hosted Control Planes

- Developer Hub / Backstage



VM Management and Observability

- Warm migration at scale from VMware, RHV (MTV)
- Cold migration from OpenStack (MTV)
- Overview dashboards for VMs and Cluster
- Individual VM ops & detailed dashboards
- Prometheus metrics can be integrated with external monitoring
- Templates for VM deployment
- Cloud-like experience to create VMs

- Consistent set of APIs
- Integrations with provisioning and management tools
- VM guest boot and application logging
- Integrate infra logs with Loki
- Virtualization Overall Health Metric
- Actionable Telemetry
- Historical trending & identify anomalies
- OpenShift Virtualization Insight rules
- Ansible collection for VM provisioning

- User-defined instance types
- Additional Ansible collections
- Multi-cluster VM management (ACM)
- Multi-cluster virtualization monitoring (with ACM)

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Thank you



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